Evaluation of a Survey Using Ordinal Logistic Regression

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Abstract

The automation of judicial services got its start in 1998 in Turkey. In order to increase performance and productivity of these services many regulations have been made in parallel with the innovations and improvements realized in the sector of information technologies. In this study, subjects, who are required to use judiciary informatics, are asked about their satisfaction from the system. The survey was prepared in April 2012 and web based questionnaire was conducted during July 2012 in Turkey. 8840 internal users contributed to the study. The satisfaction was measured under six dimensions which are performance expectancy, effort expectancy, attitude towards using technology, facilitating conditions, anxiety, and system adequacy. Those dimensions were analyzed taking into account gender, age, and occupation. Since the dependent variable is likert type, ordinal logistic regression is used to analyze the data. The results are given with the probabilities and the results are interpreted.

Key Words: judiciary informatics, user satisfaction, ordinal logistic regression.

1. Introduction

The aim of this study is to analyze the satisfaction of the users of judiciary informatics in Turkey taking into account the dimensions of performance expectancy, effort expectancy, attitude towards using technology, facilitating conditions, anxiety, and system adequacy using logistic regression.

2. Ordinal Logistic Regression

The third type is the ordinal logistic regression which is modeled for the orderly measured response, from the lowest to the highest or from the highest to the lowest. In ordinal regression cumulative logits are computed that are based on cumulative probabilities of the response levels. This approach known as the proportional odds model, takes the rank ordering of the response into account. With this model the probability of an equal or smaller response $Y \leq k$, is compared with the probability of a larger response, $Y>k$;

$$h_k(x) = \ln\left[\frac{P(Y \leq k|\mathbf{x})}{P(Y > k|\mathbf{x})}\right]$$

where k is the rank of the ordinal categories. The predicted values are computed in the same manner in nominal logistic regression;

$$\hat{g}(x)_k = \beta_{0k} + \mathbf{x}'\boldsymbol{\beta}_k$$

The models are fitted with the same set of slope parameters but different intercepts for each logit.

3. Sampling and Obtaining Data

Prepared web based questionnaire was applied to all of internal users including law clerks by The Ministry of Justice General Directorate of Information Technologies and 8840 internal users replied. The number of the internal users assigned to the questionnaire is 76 592. The empirical research was carried out between July and August 2012 in Turkey. Data were analyzed by SPSS 21.0.

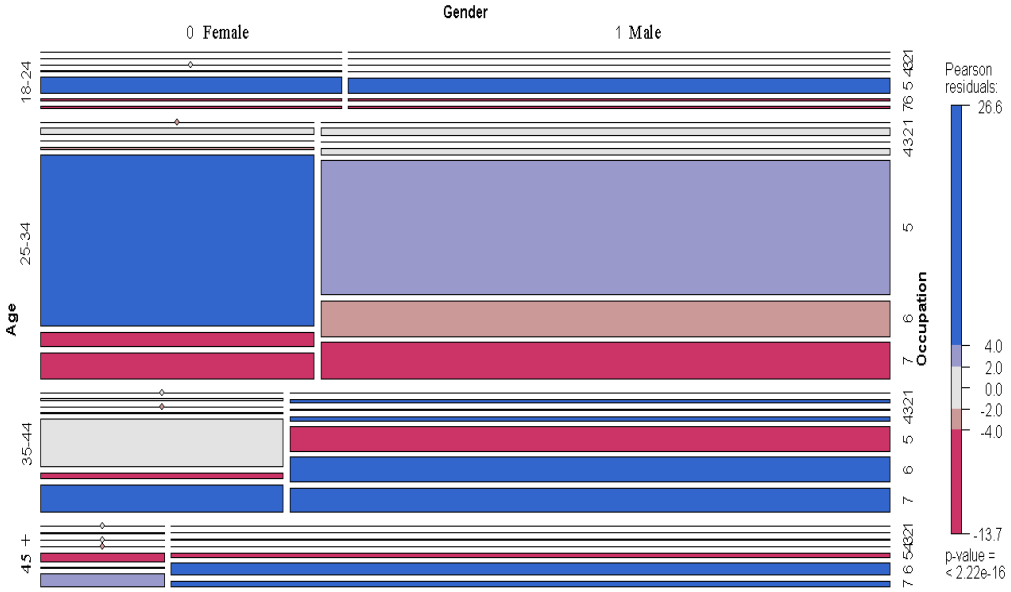
Table 1: Respondents' Demographic Characteristics

Factor		**Frequency**	**%**
Gender	Female	2628	29.7
	Male	6212	70.3
Age	18-24 years	1000	11.3
	25-34 years	4608	52.1
	35-44 years	2142	24.2
	45 and over	1090	12.3
Occupation	Judge	274	3.1
	Attorney	72	0.8
	General Solicitor	219	2.5
	Chief Judge	28	0.3
	Law Clerk	4898	55.4
	Prison Officer	1629	18.4
	Other	1720	19.5
Education	Secondary School	27	0.3
	High School	1824	20.6
	University	6479	73.3
	Master	497	5.62
	PhD.	13	0.15
Work experience (years)	1 year or less	984	11.1
	1-5 years	2866	32.4
	6-10 years	2351	26.6
	11-15 years	1066	12.1
	16 years and over	1573	17.8
Experience of the use of information system	1-3 years	3614	40.9
	4-6 years	3934	44.5
	7 years and over	1292	14.6

4. Findings and Evaluation

The dependent variable is defined as user satisfaction from judiciary informatics. The variable consists from 3 levels as y_i=1 if a respondent is dissatisfied, y_i=2 if a respondent is neither satisfied, nor dissatisfied, and y_i=3 if a respondent is satisfied from judiciary informatics.

There are nine variables that are used as predictors: **gender**, which is a 0/1 variable indicating whether internal users has female or not; **age**, which is a 1/4 variable where 1 indicates the internal users that having between 18 and 24 years old and 4 indicates the internal users that having 45 and higher years old, different internal users(1/4 and **performance expectancy**, **effort expectancy**, **attitudes towards using technology**, **facilitating conditions**, **anxiety** and **system adequacy**, which are the continuous variables that factor scores are used.



Mosaic plots give a graphical representation of these successive decompositions. Counts are represented by rectangles. At each stage of plot creation, the rectangles are split parallel to one of the two axes.

Table 2: Factors that used to obtain independent variables for logistic regression

Factor 1: Performance expectancy
Using the system in my job would enable me to accomplish tasks more quickly enhance his or her job
I would find the system useful in my job.
Use of the system can decrease the time needed for my important job responsibilities.
Use of the system can increase the effectiveness of performing job tasks.
Factor 2: Effort expectancy
It would be easy for me to become skillful at using the system.
I would find the system easy to use.
Learning to operate the system is easy for me.
Factor 3: Attitude towards using technology

I find using the system to be enjoyable.
The system makes work more interesting.
I like working with the system
Factor 4: Facilitating conditions
A specific person (or group) is available for assistance with system difficulties by email.
A specific person (or group) is available for assistance with system difficulties by telephone.
I am pleased about the services of experts in my unit.
I am pleased about the technical office services in my unit.
Factor 5: Anxiety
It scares me to think that I could cause the computer to destroy a large amount of information by hitting the wrong key.
Computers are somewhat intimidating to me.
I feel apprehensive about using judiciary informatics.
I hesitate to use a computer for fear of making mistakes I cannot correct.
Factor 6: System adequacy
Judiciary informatics is user friendly.
Using that web site enables me to accomplish tasks more quickly.
Judiciary informatics provides accurate expert directory.

Table 3: Ordinal logistic regression results

		Estimate	Std. Error	Wald	df	Sig.	Odd Ratio
Threshold	Y=1 Y=2	-2.416 1.687	0.145 0.143	276.953 138.910	1 1	0.000 0.000	
Location	Per_exp	0.857	0.051	287.839	1	0.000	2.356
	Effort_exp	0.058	0.041	1.974	1	0.160	1.060
	Attitude	1.054	0.051	424.158	1	0.000	2.869
	Conditions	0.438	0.029	224.889	1	0.000	1.550
	Anxiety	0.195	0.030	41.667	1	0.000	1.215
	System_adequacy	0.911	0.042	474.054	1	0.000	2.487
	Chief judge	0.156	0.481	0.105	1	0.746	1.169
	Judge	0.549	0.164	11.152	1	0.001	1.732
	Attorney General	0.486	0.333	2.123	1	0.145	1.626
	Solicitor	-0.174	0.178	0.957	1	0.328	0.840
	Law Clerk	-0.114	0.072	2.544	1	0.111	0.892

	Prison Officer	-0.170	0.084	4.076	1	0.043	0.844
	Other	0[a]	.	.	0	.	.
	Age (18-24)	-0.084	0.112	0.555	1	0.456	0.919
	Age (25-34)	-0.225	0.086	6.770	1	0.009	0.798
	Age (35-44)	-0.011	0.091	0.015	1	0.903	0.989
	Age (45-higher)	0[a]	.	.	0	.	.
	Female	-0.324	0.057	31.864	1	0.000	0.723
	Male	0[a]	.	.	0	.	.

At the end of logistic regression analysis, the significant models are constructed using the coefficient estimates given in Table 3 as follows:

$$\hat{g}(x)_{11} = -2.416 + 0.857(per-exp.) + 1.054(attitude) + 0.438(conditions) + 0.195(anxiety) + 0.911(system-ade.) + 0.156(judge) - 0.225(age = 25-34) - 0.324(female)$$

$$\hat{g}(x)_{12} = -2.416 + 0.857(per-exp.) + 1.054(attitude) + 0.438(conditions) + 0.195(anxiety) + 0.911(system-ade.) + 0.170(prison\ officer) - 0.225(age = 25-34) - 0.324(female)$$

$$\hat{g}(x)_{21} = 1.687 + 0.857(per-exp.) + 1.054(attitude) + 0.438(conditions) + 0.195(anxiety) + 0.911(system-ade.) + 0.156(judge) - 0.225(age = 25-34) - 0.324(female)$$

$$\hat{g}(x)_{22} = 1.687 + 0.857(per-exp.) + 1.054(attitude) + 0.438(conditions) + 0.195(anxiety) + 0.911(system-ade.) + 0.170(prison\ officer) - 0.225(age = 25-34) - 0.324(female)$$

Using the models given above the probabilities of satisfaction from judiciary informatics for certain properties can be calculated.

5. Conclusions

The satisfaction from judiciary informatics is examined using 6 factors, performance expectancy, effort expectancy, attitude towards using technology, facilitating conditions, anxiety, system adequacy and 3 demographic variables, age, occupation and gender.

It is concluded that attitude towards using technology, system adequacy, performance expectancy are the most affective factors on satisfaction from judiciary

informatics. When the occupation is taken into account, being a judge or not is the most affective one. On the other hand conditions and the anxiety are affective on satisfaction from judiciary informatics, too. It is found that the less affective one is gender on satisfaction from judiciary informatics.

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